

SAF-E381-81
2 June 1981

MEMORANDUM FOR: All Recipients of the April 1981 SAFE Monthly Progress Report

STAT

FROM :
Director, Consolidated SAFE Project Office/ODP

SUBJECT : Clarification of the Overview Section of the Above Monthly Report

The April report overview infers only one cause for the schedule problems which the Audit team reviewed. The entire audit report is enclosed for your information.

The audit was conducted in response to CSPO's criticism to TRW Division-level management of the results of systems PDR and related detailed technical reviews.

While there are problems remaining in full detailed definition of conversion requirements and there are still a few facets of requirements under discussion, the report as stated leads to the erroneous impression that these are the major factors impeding progress.

This topic will be covered thoroughly at the next Steering Committee meeting and interim progress will be communicated as appropriate. Meanwhile we are participating with TRW in the planning for schedule recovery.



STAT

Attachment: As stated

cc: R. Evans/TRW

TRW

81.35656.01-045
18 May 1981

STAT

STAT

Attention:

Subject: SAFE Audit

STAT

Dear Mr.

The accompanying report summarizes the results and recommendations obtained from the SAFE Audit which was conducted on 23 April 1981.

Sincerely,



R. D. Williams
Assistant General Manager for Projects
Systems Engineering and Integration Division
TRW Inc., Defense and Space Systems Group

RDW:ER:sf

Enclosure: As stated

STAT

cc:

SAFE AUDIT
23 April 1981

1.0 PURPOSE

This report summarizes the results and recommendations obtained during a SAFE Audit conducted on 23 April 1981. The purpose of this audit was to:

- Review the current status of the SAFE Block 1 schedule
- Address specific CSPO concerns which surfaced at DDR1/IDR2

The motivation for the audit stemmed from design reviews (DDR1 and IDR2) conducted approximately 1 month earlier where the CSPO raised concerns about problems and risks associated with the current Block 1 schedule.

This report also provides the Audit Team's assessment of some other CSPO concerns which were communicated to SEID top management subsequent to the design reviews. Finally, it provides TRW's most recent planning to implement a FAILSAFE Implementation Plan which incorporates an Increment 2.5 capability as a part of Block 1. The impetus for this final item came from the recommendations of the Audit Team which are provided in more detail later in the report.

2.0 SUMMARY

An Audit Team was established by SEID management to address the CSPO concerns. During a one-day review and subsequent meetings and discussions, the Audit Team gained insight in two general areas: Block 1 schedule problems/risks and other CSPO concerns provided to SEID top management shortly after the

DDR1/IDR2. The consensus of the Audit Team was that the current SAFE Block 1 schedule is high-risk showing at least 3 to 6 months negative slack if nothing is done now to correct problem areas. In addition, the Audit Team generally agreed with other specific CSPO concerns, such as work slippage and deemphasization of documentation.

Throughout the audit process, the team members were particularly pleased and encouraged to see that several decisive actions had already been taken to address the problem areas. Convinced that this was a step in the right direction, the Audit Team further provided some recommendations geared at reducing, if not eliminating, any negative slack so as to maintain the Block 1 schedule. These recommendations included:

- o Establishment of a FAILSAFE Implementation Plan for Block 1 which would provide the capability for all operational threads prior to the currently scheduled Increment 3. This earlier milestone would be referred to as Increment 2.5
- o Closure of remaining Block 1 requirements issues by 15 June
- o Increased emphasis on performance of pre-integration of hardware (COMM and ADPE) with early software increments
- o Alteration of the design review cycle so that documentation/CDRL's are delivered prior to reviews (approximately 30 days)
- o Accelerate Process Design Document and performance budget allocations

3.0 DISCUSSION

Based on the objectives delineated above, a team was formed to perform an in-depth review. The Audit Team was established by the Systems Engineering and Integration Division (SEID) with R. D. Williams, Assistant General Manager of SEID, as its

chairman. Additional members of the Audit Team are contained in Table 1. The Audit Team members were chosen so as to provide: TRW project management experience, SAFE project knowledge and direct interface with the SAFE-related skill centers.

To insure that the audit would most productively address the appropriate issues, an agenda (see Table 2) was jointly developed by the SAFE Block 1 Team (L. L. McLaughlin) and the Audit Team (D. H. Barakat). Once the agenda was approved by SEID top management, the audit was scheduled for and conducted on 23 April 1981.

3.1 Audit Day

Throughout the day, the Block 1 Team presented both concise and informative briefings addressing the various topics on the agenda. It was clear from the presentations and the two-way interaction that project personnel were highly motivated to succeed. They exhibited a high-level of commitment and displayed an unusually high esprit de corps. The Audit Team asked many questions and dug deep for data, particularly in the areas of schedules, development methodology, system performance, productivity and requirements issues. The Audit Team was impressed with the level of insight project personnel displayed and felt that, as a whole, they had received a very honest "data dump".

The agenda had been designed to allow some time late in the day for the Audit Team to discuss and provide their initial impressions back to the Block 1 Team. These impressions generally fell into two categories: schedule problems/risks and assessment of specific CSPO concerns provided to SEID top management. The following sections provide Audit Team results/conclusions/recommendations developed the day of the

Table 1, SAFE Audit Team Members

- R. D. WILLIAMS, CHAIRMAN
- D. H. BARAKAT, ASSISTANT CHAIRMAN
MANAGER, DATA SYSTEMS SOFTWARE LABORATORY (DSSL)
- J. R. DISTASO,
MANAGER, SOFTWARE SYSTEMS ENGINEERING LABORATORY (SSEL)
- G. C. WRIGHT,
MANAGER, OPERATING SYSTEMS AND SUPPORT SOFTWARE
DEPARTMENT (OSSSD)
- F. J. EMMA,
MANAGER, SOFTWARE TECHNOLOGY DEPARTMENT (STD)
- D. R. STAFFORD,
MANAGER, PROCESS DESIGN AND INTEGRATION DEPARTMENT (PDID)
- R. T. WITTON,
MANAGER, GUIDANCE SOFTWARE DEVELOPMENT DEPARTMENT (GSDD)

Approved For Release 2003/12/18 : CIA-RDP84-00933R000500090008-2

TABLE 2, Agenda for SAFE Audit - April 23, 1981 - 8:30-5:30

<u>TIME</u>	<u>SUBJECT</u>	<u>PRESENTER</u>
8:30 - 8:40	● INTRODUCTION	L. L. McLaughlin/ D. H. Barakat
8:40 - 9:40	● PROJECT PLAN	L. L. McLaughlin
	<ul style="list-style-type: none"> - Present Block 1 Master Schedule and Activity Network - Discuss Schedule Status - Describe Magnitude of Development - Identify Critical Path Items - Identify Schedule Risks 	
9:40 - 10:30	● DDR1/IDR2 OVERVIEW	L. L. McLaughlin
	<ul style="list-style-type: none"> - Summarize TRW Presentations - Summarize Briefing to CSPO - Present CSPO Post-Review Comments 	
10:30 - 12:00	● DDR1/IDR2 CLOSEOUT ACTIVITIES	L. L. McLaughlin
	<ul style="list-style-type: none"> - Discuss Other Issues Identified by Project - Describe Team Approach to Resolve CSPO + Project Concerns - Present Team Plans: 	
	<ul style="list-style-type: none"> Architecture Threads Development Documentation Test Bed Support S/W User Interface 	<ul style="list-style-type: none"> M. L. Squires J. A. Brown H. M. Krich P. W. Rosenberger J. S. Daunis P. R. Skinner D. E. Schaefer
12:00 - 1:00	● LUNCH SERVED	-- OPEN FORUM
1:00 - 3:30	● DISCUSSIONS OF SELECTED ELEMENTS	
	<ul style="list-style-type: none"> - Block 1 Engineering - System Services Software - Applications Software - Product Assurance . . - Others as required 	<ul style="list-style-type: none"> H. M. Krich J. S. Daunis J. A. Brown F. S. Ingrassia
3:30 - 4:30	● AUDIT TEAM CAUCUS	N/A
4:30 - 5:15	● AUDIT TEAM FEED-BACK	D. H. Barakat, et al
5:15 - 5:30	● FINAL OBSERVATIONS	R. D. Williams

Approved For Release 2003/12/18 : CIA-RDP84-00933R000500090008-2

Audit as well as in subsequent discussions preparatory to the briefing to CSP0 management on 1 May 1981.

3.2 Results/Conclusions

The consensus of the Audit Team was the the current SAFE Block 1 schedule is high-risk ~~showing at least 3 to 6 months~~ [negative slack]. This was evident after reviewing the SAFE master schedule for Block 1, the associated activity network and a critical-path analysis. (These are provided as Figures 1, 2, and 3 respectively, in Attachment A.) In addition, the presentation of the individual subproject and team plans (shown in Table 2) provided even further insight to support this consensus.

The Audit Team felt that there were several major functions causing the Block 1 schedule to be viewed as high-risk. They included, but were not limited to:

a) Size and growth of the software

Current sizing estimates put SAFE Block 1 at 425K source instructions to be integrated including Burroughs software; 125K source instructions of that total represented new software to be developed which has grown approximately 25% since SDR. The current size of the software is very large and its design, development, and implementation on the current schedule is high-risk. This is due to not only the absolute calendar time, but also the high degree of schedule parallelism of the 3 increments. The schedule risk is further compounded by the fact that experience indicates the new software could be expected to grow by as much as 20%.

b) Deferment of capability and complexity into later increments

Compounding the software growth issue is the fact that at present 40% of the Block 1 software is now scheduled to be developed during Increment 3 as opposed to the original estimate of 25%. Due to the previously described software growth, this now represents a

doubling in the number of instructions for Increment 3 (50.2K vs. 26.1K). Due to a number of reasons, not the least of which is requirements ambiguity, implementation of complex functions is also being deferred to Increment 3 so that the earlier increments can proceed.

c) Extremely high productivity rates

Software growth and deferment of capability until later increments have created a situation whereby extremely high productivity rates (instructions developed/manmonth) would be required to complete Block 1 on schedule. This is particularly so for Increment 3 in the Applications, EMP, and SCM software areas.

d) Lack of requirements closure

The resolution of new, late or ambiguous requirements further aggravates the schedule risk. This is particularly true in the areas of the ODP I/F, User and Operator I/F, and the SAFE C conversion.

e) Impact of late communications capabilities

The current schedule for the COMM (WBC and ICC) precludes full test bed utilization which was a key element in the initial implementation plan. The test bed utilization was designed to facilitate schedule parallelism and reduce risk early-on in the development cycle.

With respect to the specific CSP0 concerns presented to SEID top management, the Audit Team directly addressed five key items. The concerns, Audit Team impression of the concerns, and ideas/comments are presented in Table 3. In general, the Audit Team was supportive of the CSP0 concerns which can be seen from Table 3. It did, however, feel that two items, "Erosion of Design Review Process" and "SCM Maturity", have been typical concerns at this stage in maturity on previously successful TRW projects.

Table 3. Selected CSPO Concerns

<u>Concern</u>	<u>Audit Team Impression</u>	<u>Comments/Ideas</u>
Slippage of Work	CSPO is right Bow-waving complexity; current projected growth is a worry. IDD may be at too high level.	Utilize FAILSAFE development approach. External dependencies are critical -- extremely late H/W & S/W hook-ups. Do honest self-assessment.
Late Documentation	CSPO is right <u>Appears</u> to have gotten little attention.	Implement Documentation team recommendations. Brief CSPO Need plan to avoid next time.
Erosion of Design Review Process	Not significantly different from other projects. Toggling on level of detail.	Rephase documentation/CDRL process to provide prior (30 days) to reviews. Prioritize Process Design Document; draft due 15 May.
System Performance and Architecture Design	Architecture, system design and modularity employ sound techniques Performance analysis, measurement, budget allocation, benchmarking, etc - <u>real</u> issue.	Thread team schedule too late Do quick and dirty approach -- within a week. Update in 3 weeks. Continue update process using Thread team plan.
SCM Maturity	Correct to emphasize EXCES design first. Long enough delay -- allocate resources and attention to SCM.	Do sizing and productivity analysis. Utilize related project experience. Get going!!

What's Currently Being Done

During the course of the Audit and subsequent discussions, the Audit Team was particularly pleased and encouraged to see that several decisive steps had already been taken to address both the schedule problems/risks and other CSPO concerns. First, "tiger teams" had been established and were in operation to address open issues from DDR1/IDR2. Accordingly, team plans had been impressively presented during the Audit (see Table 2). To minimize the schedule impact of late external deliveries (to the subsystems area), plans had been developed to provide and utilize an interim ICC capability. In addition, a detailed implementation plan had been developed to permit full scale software development without the availability of the total computer network. Finally, to minimize risk and implement partial test bed capability, extensive software prototyping was being utilized. Although this was occurring on several fronts, the most critical were in the System Services and GRS areas where prototype software had already been incorporated into the unit test bed.

The Audit Team was impressed with these actions and felt that they could go a long way towards addressing DDR1/IDR2 issues. However, there was still substantial risk remaining in the SAFE Block 1 schedule and it was also not entirely clear that all of the CSPO concerns had been fully addressed. Therefore, to further reduce/eliminate the negative schedule slack, the Audit Team provided the following recommendations to SEID top management, the SAFE Project Office and, ultimately, CSPO management.

3.3 Recommendations

The Audit Team recommended that the SAFE Project set priorities and allocate appropriate resources to hold the Block 1 schedule. To do this, it further recommended that the Project develop a FAILSAFE Implementation Plan with the following elements:

- a) Pull back certain prioritized Increment 3 capabilities into an earlier increment.

This new increment would be called Increment 2.5 and would implement all operational threads. In particular, Increment 2.5 would pull into earlier development some of the higher risk software elements currently planned for development in Increment 3. These elements would be chosen so that all threads could be executed start-to-finish, even though full functional capability might not be provided until Increment 3. To even further reduce development risk, appropriate prototyping activities would be initiated immediately.

A key element of this implementation plan was that Increment 2.5 would provide enough capability to support user and operator training, initiate transition to a "live" operational data base, and provide a minimal operational capability to be used at -site, if so desired, by CSPO.

Increment 3 would then provide the remaining capabilities for Block 1. Thus, there would be no erosion of capabilities for Block 1.

- b) Close remaining Block 1 requirements issues by 15 June.

Successful implementation of the FAILSAFE approach required that any open requirements issues be closed very quickly. The Audit Team had been appraised of these areas during the Audit and the Block 1 Team pointed out that their closure was critical to a successful Block 1. The most critical areas were the ODP I/F, User and Operator I/F, and SAFE C Conversion. If open issues could not be resolved by 15 June, the Audit Team recommended that the Block 1 Team make the best technical judgement possible to tie down the requirement and proceed with the design.

- c) Perform pre-integration of hardware (COMM + ADPE) with early software increments.

Given that the WBC and ICC developments are behind schedule, full hardware/software integration is not possible until later in the schedule. To minimize risk an approach was recommended whereby pre-integration of available hardware would be conducted with early software increments. The Audit Team observed that the Block 1 Team had already been developing such a plan and strongly encouraged its implementation.

- d) Alter the review cycle so that documentation/CDRL's are delivered prior to reviews (approximately 30 days).

The Audit Team observed that a more effective review process (for both CSP0 and TRW) would occur if documentation/CDRL's in support of reviews would be delivered prior to the review. Utilizing this approach, which has been quite successful in other programs, would enable questions, issues, concerns, etc., to be surfaced prior to the review itself. With such a dialogue established both the CSP0 and TRW could more effectively use the design reviews to work issues rather than review documents and attend lengthy tutorial briefings.

- e) Perform the following activities to further reduce Block 1 schedule risk.

1. Quickly generate a Process Design Document which would provide a system design overview, define configurations, examine and allocate performance budgets, etc. A first draft of that document would be due in May.
2. Establish performance budgets and allocate them to appropriate subsystems. Since the development cycle is quite far along the Audit Team strongly recommended a very quick establishment of preliminary budgets. The first set should be developed within a month, with monthly updates to be provided by the already established and chartered Thread Team.
3. Implement Documentation Team recommendations to get the document production cycle back on course.

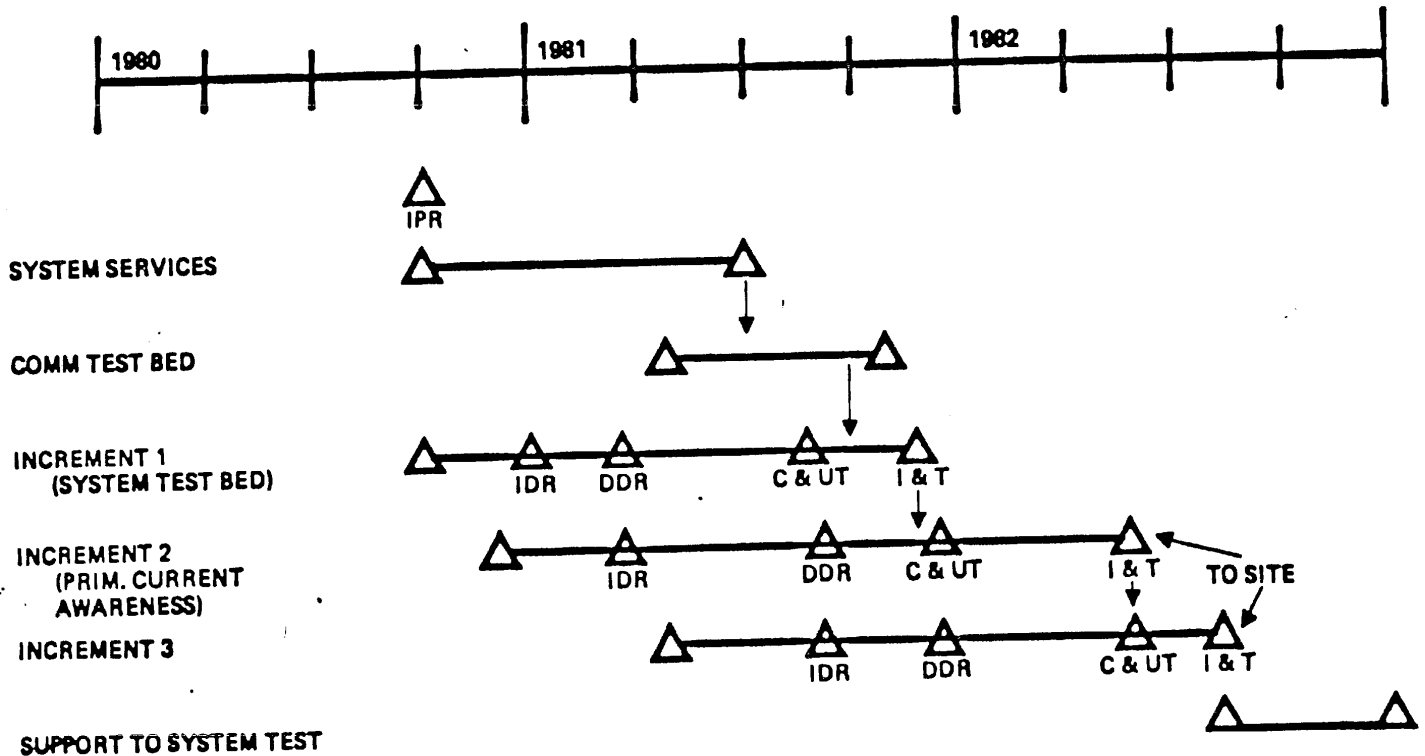
4. Enlarge and accelerate training activities at both the technical and first line managerial level. This would involve SAFE-specific courses in project management, development methodology and standards/practices. These courses already exist but need to be tailored to the SAFE Project needs; instructors would be provided out of the Software Systems Operation within SEID.

The Audit Team generally concurred with the observations/concerns surfaced by CSP0 during and after the design reviews. It should come as no surprise that the SAFE Block 1 Team was aware of and already working some of these same issues. The Audit Team felt that the aforementioned FAILSAFE Implementation Plan* would address many of the issues surfaced. In addition, it was the best near term plan to hold schedule by forcing early focus on the system capabilities (threads) needed to minimize Block 1 schedule risk. Finally, this approach was clearly the best way to minimize cost growth in the program which is and needs to continue to be a vital concern.

* The Audit Team set 15 May as a goal for development of the FAILSAFE Implementation Plan. It is contained as Attachment B of this memo.



PROJECT SCHEDULE FOR BLOCK 1



ATTACHMENT A

STAT

Approved For Release 2003/12/18 : CIA-RDP84-00933R000500090008-2

Next 4 Page(s) In Document Exempt

Approved For Release 2003/12/18 : CIA-RDP84-00933R000500090008-2